



MARINE DIVISION

Certificate number: 05583/E0 BV

File number: ACM 135/0618/001

Product code: 2090H

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

FUTURE PIPE INDUSTRIES B.V.

Hardenberg - NETHERLANDS

for the type of product

THERMOSETTING MATERIAL PIPES AND FITTINGS

Glass Reinforced Epoxy Pipe Systems

Fibermar (EMT, EMT-FR, CMT, CMT-FR) and Wavistrong (EST, EST-FR, CST, CST-FR)

Requirements:

- BUREAU VERITAS Rules for the Classification of Steel Ships
- BUREAU VERITAS Rules for the Classification of Offshore Units
- IMO Resolution A.753(18)

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 18 May 2016

For BUREAU VERITAS,

At BV ROTTERDAM, on 18 May 2011,

Jurriaan GULJE



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with BUREAU VERITAS. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of BUREAU VERITAS Marine Division available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against BUREAU VERITAS for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION

Glass Reinforced Epoxy Pipe Systems:

- **Fibermar Series EMT, EMT-FR, CMT, CMT-FR**
- **Wavistrong Series EST, EST-FR, CST, CST-FR**

1.1 Product description

- Fibermar and Wavistrong Epoxy Pipes systems are manufactured by filament winding continuous glassfibres impregnated in an aromatic or cyclo aliphatic amine cured epoxy system.
- Type of product: Glass Reinforced Epoxy (GRE)
- Wall structure consists of a resin-rich inner layer and is reinforced with a C-glass fleece or a linear polyester non-woven. The thickness of the liner will be 0.5 mm.
- Diameters of 25 mm to 900 mm
- Maximum service temperature: 100°C
- Pipe wall electrical resistance: 10 Mohm @1500 volt
- Type of joints: Adhesive bonded joint (CJ), Rubber seal joint (RSJ), Rubber seal lock joint (RSLJ), Flange joint (FL), Laminate joint (LJ), Mechanical coupler (MC).

1.2 Pressure rating

- External pressure 10, 20, 30, 40, 50 mwc (Fibermar)

DN	EMT/CMT 10 Ext. Press. 1 bar w.t / PN	EMT/CMT 20 Ext. Press. 2 bar w.t / PN	EMT/CMT 30 Ext. Press. 3 bar w.t / PN	EMT/CMT 40 Ext. Press. 4 bar w.t / PN	EMT/CMT 50 Ext. Press. 5bar w.t / PN
25					2.6 / 16
40					2.6 / 16
50					2.6 / 16
65					2.8 / 16
80					3.2 / 16
100					3.8 / 16
125					4.5 / 16
150	3.4 / 10				5.3 / 16
200	4.2 / 10	5.1 / 16	5.8 / 16	6.3 / 16	6.7 / 16
250	5.1 / 10	6.2 / 16	7.0 / 16	7.6 / 16	8.2 / 16
300	5.9 / 10	7.3 / 16	8.2 / 16	9.0 / 16	9.6 / 16
350	6.8 / 10	8.3 / 16	9.5 / 16	10.3 / 16	11.1 / 16
400	7.6 / 10	9.4 / 16	10.7 / 16	11.7 / 16	12.6 / 16
450	8.5 / 10	10.5 / 16	11.9 / 16	13.1 / 16	14.0 / 16
500	9.3 / 10	11.5 / 16	13.1 / 16	14.4 / 16	15.5 / 16
550	10.1 / 10	12.7 / 16	14.4 / 16	15.0 / 16	17.0 / 16
600	11 / 10	13.7 / 16	15.6 / 16	17.1 / 16	18.4 / 16
700	12.7 / 10	15.8 / 10	18.0 / 10	19.8 / 10	21.4 / 10
750	13.5 / 10	16.9 / 10	19.3 / 10	21.2 / 10	22.8 / 10
800	14.3 / 10	17.9 / 10	20.5 / 10	22.5 / 10	24.3 / 10
900	16 / 10	20.1 / 10	22.9 / 10	25.2 / 10	27.2 / 10

w.t / PN means reinforced wall thickness in mm / PN Pressure Nominal in bar

- Maximum internal pressure (Fibermar): 16 bar
- Maximum internal pressure (Wavistrong): 24 bar

1.3 Raw material as per manufacturer's specification

- Epoxy resin
- Epoxy curing agents
- Reinforcements by glass roving, glass tissue and glass fleece

2. DOCUMENTS AND DRAWINGS

- Manufacturer's catalogue Wavistrong Epoxy Pipe Systems REP 260 Rev 01/1297 including General product applications, quality assurance, product list, chemical resistance, engineering manual, installation manual, specifications.
- Wavistrong inspection quality control plan Rep 344 /Rev. 01/0598

No departure from the above documents shall be made without the prior consent of the Society. The manufacturer must inform the Society of any modification or changes to these documents and drawings.

3. TEST REPORTS

- 3.1 Fire endurance level L3 according to IMO Resolution A.753 (18) per the test report N° 846000.18/96.103-A SINTEF dated 17/04/1996.
- 3.2 Flame spread test according to IMO Resolution A.653 (16) per the test reports carried out by the University Gent:
- N° 9677 A dated 06/06/2000 - Total thickness of 14 mm and total volumic mass of 1392 kg/m³
 - N° 9677 B dated 06/06/2000 - Total thickness of 37 mm and total volumic mass of 1378 kg/m³
- 3.3 Flame spread test according to ASTM D 635-97 per the test reports carried out by the Centre for Fire Research TNO:
- N° July 2001-CVB-R03899 - Wavistrong GRE, thickness approx. 7.5 mm
 - N° July 2001-CVB-R03900 - Fibermar GRE, thickness 7-7.5 mm
- 3.4 Short term pressure resistance test of a spool Fibermar pipes and fittings Series EMT 10 PN 10:
- N° 0602101 dated 18/01/2006 witnessed by a Surveyor's Classification Society.

4. APPLICATION / LIMITATION

4.1 Both Fibermar and Wavistrong pipes and fittings are approved for any application where fire endurance to level 3 piping is required in accordance with Pt C, Ch 1, App 3 [2.3.1] of Bureau Veritas Rules (or appendix 4 of IMO Resolution A.753 (18)). These intended systems may be:

- Ballast, tank cleaning system, inert gas effluent, sea water, fresh water, scuppers and sanitary discharges, sprinkler system, in-tank cargo lines, drain system,
- Bilge pipes inside cargo tanks if the latter are kept under inert gas,
- Fire mains provided that pipes are kept full of running water constantly and provided the joints are protected with an approved protective coating.

4.2 The products Fibermar CMT and Wavistrong CST Conductive Series can be installed in areas that need conductive application (cargo tanks) and in fire areas (i.e. pump rooms).

4.3 Detailed drawings of each piping system are to be submitted for review of compliance with the Rules and the applicable regulations.

4.4 Installation is to be in accordance with the manufacturer's guidelines. The personnel performing this work are to be properly qualified and certified to the satisfaction of the Society.

4.5 For piping required to be electrically conductive, earthing is to be checked and random resistance testing is to be conducted after completion of the installation.

4.6 Behaviour in case of fire (smoke generation and toxicity) is to be deemed satisfactory by the flag authorities of the ship on board which the piping system is fitted.

5. PRODUCTION SURVEY REQUIREMENTS

5.1 The products are to be manufactured, examined and tested by the manufacturer in accordance with the approved type described in this certificate and Requirements stated on the front page of this certificate.

5.2 Production sites are to be recognized by Bureau Veritas as per NR 320 for HBV products. To this end, the manufacturer has to make the necessary arrangements for a Society's Surveyor to perform visits and product audits at the production sites.

5.3 The manufacturer has declared to Bureau Veritas that the products detailed in this certificate are manufactured at the production site stated on the front page of this certificate.

5.4 Each pipe and fitting is to be tested by the manufacturer at a hydrostatic pressure not less than 1.5 times the nominal pressure. Other recognised national or international standard may be accepted for pipes and fittings not employing hand lay up techniques. Depending upon the intended application the Society may require the pressure testing of each pipe and/or fitting.

5.5 Bureau Veritas certificate is not required for the product to be fitted on board units to be classed with Bureau Veritas.

6. MARKING OF PRODUCT

Fibermar and Wavistrong pipes and fittings shall be marked with at least:

- Trade name: Fibermar or Wavistrong
- Nominal diameter
- Pressure rating
- Identification code. The identification code corresponds with the production data.

The marking shall remain legible under normal handling and installation practices.

7. OTHERS

This approval is given on the understanding that the manufacturer will accept full responsibility for informing shipbuilders or their sub-contractors of the proper methods of fitting and general maintenance of the product and of the conditions of this approval.

This certificate supersedes the Type Approval Certificate N° 05583/D0 BV issued on 05/04/2006 by the Society.

***** END OF CERTIFICATE *****